An Analysis of the Early Prediction of Highway Construction Project Completion using the Contract Status Report

A Certified Public Manager Research Project

February 2016

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ABSTRACT:

A key element of project management is monitoring and controlling the project schedule[1]. As a part of the construction project management process at The South Carolina Department of Transportation (SCDOT), monthly project measurements are utilized to assist project managers with monitoring construction project progress. There are many factors that cause a deviation from the project plan that result in the extension of contract time. Identification and mitigation of issues early on in the life of the project could prove to lessen the impact on extended contract time. This research evaluates the frequency of poor monthly project measurements as a predictor of late project completion.

Five years of monthly construction project measurement data were evaluated for a relationship between project monthly status and the type of work involved, the number of bid days, the adjusting of the contract completion date, the days the project overran the original completion date, the days the project overran the adjusted completion date, the bid cost, and the percent of time elapsed in the project where work began for 1670 contracts. The results focused on projects falling in the Bridge (BRDG), General (GNRL), or Hot Mix Asphalt (HMAS) work type categories. These work type categories made up 88% of the total project cost for the 5-year duration analyzed. The research reveals that recurring poor status is an indicator of project delivery issues, but it is not considered a definitive predictor of on-time project delivery failure.

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Introduction

Born as a result of or in response to a global failure to perform, controlling contract time is not a recent concept. The March 15, 1939 South Carolina State Highway Department, Standard Specifications for Highway Construction provided contract language in support of project completion within the time frame established in the contract proposal [2]. Timely project completion remains an important part of project management at the South Carolina Department of Transportation (SCDOT). Funding has remained relatively flat while infrastructure has continued to decline. The 2013 Report Card completed by the American Society of Civil Engineers (ASCE) reported a nationwide funding GAP for Surface Transportation of $846 billion[3]. Without careful balancing of competing project constraints of scope, quality, schedule, budget, resources, and risk[4], the decline of infrastructure in South Carolina will be greater.

The SCDOT performs monthly construction project measurements as an indicator of project health. Discussion about the report occurs between the Resident Construction Engineers in the district, the District Construction Engineers in the districts, and the Assistant Construction Engineers in the Director of Construction Office. While the monthly report is an indicator of the project health at that point in time, there is not a formal understanding of how these measures line up month to month, consecutively or randomly, through the life of the contract. When aligned, these indicators could be a signal that a project is in danger of not completing on time.

Early 2000's reporting included project data from SiteManager, construction management software used for all construction projects managed by the Agency. Each

month, progress payment generation occurs for each contract where there is work completed on payable items. As the contract progresses and work is completed, the cumulative value of this physical work increases. The cumulative value of work complete is the basis of contract performance analysis.

The data in SiteManager are records of all activities occurring on the project each workday. Data used to evaluate contract performance include the notice to proceed date (NTP), the adjusted completion date, the latest estimate period end date, the total dollar amount paid to date, the total bid amount, and the total dollar amount of all change orders (CO). The analysis for contracts not requiring a formal schedule from the contractor is a straight-line comparison of work percent complete compared to time percent complete. Time percent complete (also referred to as Time Elapsed) is defined as,

$$\text{Time percent complete } = \frac{(Estimate\ End\ Period\ Date - Adjusted\ Contract\ Completion\ Date)}{(Notice\ to\ Proceed\ Date - Adjused\ Contract\ Completion\ Date)}$$

Equation 1. Calculation of Time Percent Complete

The work percent complete is defined as,

$$\text{Work percent complete} = Total\ Paid\ to\ Date\ /(Total\ Bid + Change\ Order\ Amount)$$

Equation 2. Calculation of Work Percent Complete

As the Agency began requiring a formal schedule from the contractor via Primavera, additional data was available to assess project health. Primavera provides a

schedule variance based on the planned value of work compared to the actual value of work completed as of the estimate period end date. As work is complete, the contractor performs monthly updates to the schedule and submits it to the Agency.

Monthly straight-line or schedule variance results receive a measure gauging project health. The order of precedence of data assigned a measure is the Primavera schedule variance and then the SiteManager straight-line comparison. In either case, the project measure is defined as follows:

Status 1 – Project schedule variance or straight-line comparison is less than 10% (good health)
Status 2 – Project schedule variance or straight-line comparison is 10% to less than 25% behind (barely acceptable)
Status 3 – Project schedule variance or straight-line comparison is 25% to less than 100% behind (poor health)
Status 4 – Project schedule variance or straight-line comparison is 100% or greater behind (poor health)

Table 1. Contract Status Project Measure

A flow chart of data used to develop the report is included in Attachment A. An example of the contract status report is included in Attachment B.

History has shown that projects move in and out of poor status through the life of the project. Predicting the success or failure of a project to complete on time because of its recent history on the contract status report could provide our project managers another tool for monitoring contract progress. In many instances, poor contract progress results in the loss of contract time and late completion of projects. This research evaluates the combinations of work type, point in time physical work begins, recent poor status, and contract bid amount as indicators of late project completion.

Methods

Evaluation consisted of Excel data used to create contract status reports for the monthly periods from March 2009 through December 2013. Selection of this period minimized variables affecting the data, such as scheduling specification changes. Data grouped by the Contract_ID and sorted by contract time elapsed provided the basis for coding. The Contract_ID is a unique contract identifier used in SiteManager. Contract time elapsed is a measure, calculated based on *Equation 2*, common to every project regardless of variables such as bid price, work type, location, or value of work complete.

Initial coding provided data classification by contract status number less than 3 or greater than 2 and by time elapsed. Time elapsed classifications ranged from less than 0.1 to greater than or equal to 2.5 in tenth increments. This correlates to less than 10% to greater than 250% time elapsed. The following chart is an example of the coding applied.

Code	Criteria I - Time Elapsed	Criteria II – Status Number
Output 13	>=0.6 <0.7	<3
Output 14	>=0.6 <0.7	>2
Output 15	>=0.7 <0.8	<3
Output 16	>=0.7 <0.8	>2
Output 17	>=0.8 <0.9	<3
Output 18	>=0.8 <0.9	>2
Output 19	>=0.9 <1.0	<3
Output 20	>=0.9 <1.0	>2

Table 2. Example of Coding for Time Elapsed and Status Number

The coding identified the occurrences of a project in a poor status. As an example:

CONT_ID	Number of Entries on Status Report	Number of Entries in Status 3 or 4	Number of Entries in poor status <10% Time Elapsed	Number of Entries in poor status =>10% and <20% Time Elapsed	Number of Entries in poor status =>20% and <30% Time Elapsed	Number of Entries in poor status =>30% and <40% Time Elapsed	Number of Entries in poor status =>40% and <50% Time Elapsed	Number of Entries in poor status =>50% and <60% Time Elapsed
01.038220	11	0	0	0	0	0	0	0
01.038329	14	1	0	0	0	0	1	0
01.038796	5	0	0	0	0	0	0	0

Table 3. Example of Count of Status per Contract

Additional coding applied to each contract identified whether the project finished by the original completion date, an assignment to a contract bid amount group, the point in time a contract appeared in a poor status and the percent complete when actual work began. Excel pivot tables are used for easy organization and comparison of the coded data.

Data Analysis and Discussion

Monthly combined data included evaluation of 15,591 data points for 1670 contracts. General contract completion results based on SiteManager dates are included in *Figure 1. Time Completion*. As shown in the "Overall" category, the total number of projects that did not adjust the original contract completion is approximately equal to the number of contracts with adjusted completion dates. Work type descriptions are included in Attachment C.

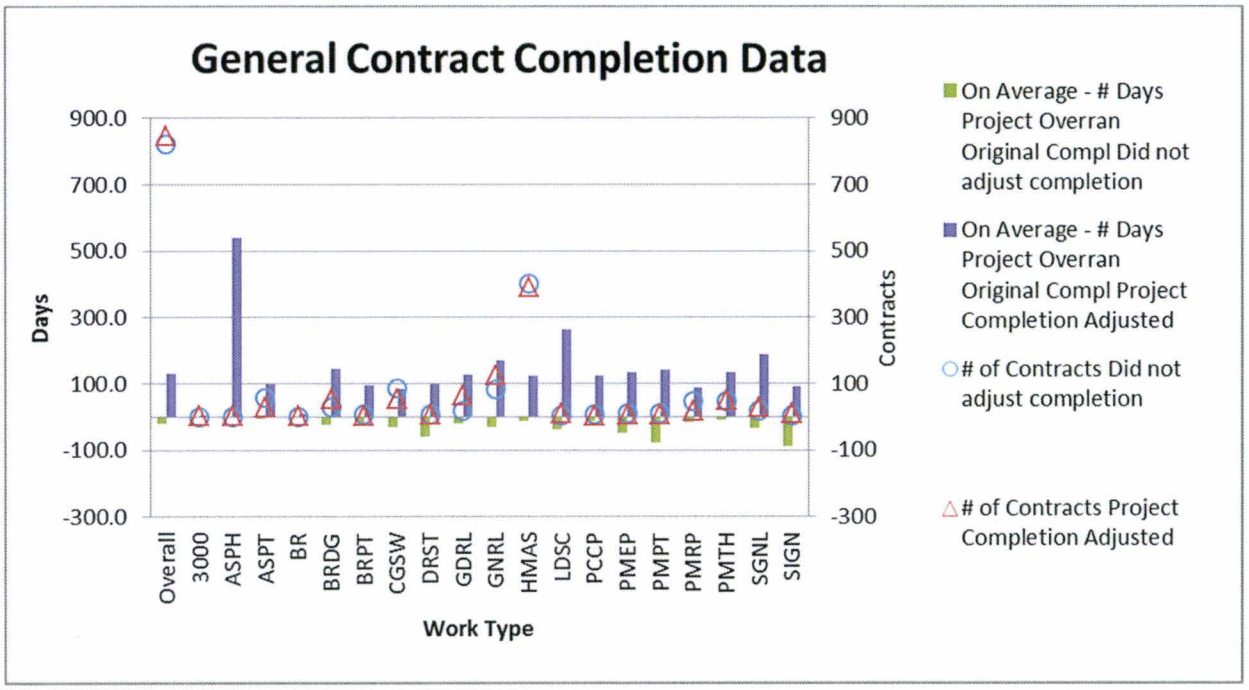


Figure 1. Time Completion

Of all work types considered, the primary focus of the results is for the work types identified with a red arrow in *Table 4. Data Distribution by Work Type*. Results for all work types are included in Attachment D. Bridge (BRDG), General (GNRL), and Hot Mix Asphalt (HMAS) work types make up approximately 88% of the project value and 65% of the number of contracts included in the data. Work types such as Guardrail (GDRL) and Signal (SGNL) are multi-year contracts renewable at the Agency's discretion. Adjustment to the contract completion date is typically a planned adjustment.

Work Type	# of Contracts	Project Value Mar 2009 to Dec 2013	Project Value % of Total
3000	1	$2,268,067.00	0.1%
ASPH	1	$829,374.34	0.0%
ASPT	82	$57,401,464.20	1.7%
BRDG	78	$455,778,520.05	13.8%
BRPT	8	$8,421,248.00	0.3%
CGSW	139	$32,872,383.58	1.0%
DRST	12	$6,653,093.96	0.2%
GDRL	80	$42,597,619.13	1.3%
GNRL	207	$862,928,361.39	26.2%
HMAS	795	$1,593,292,359.51	48.4%
LDSC	11	$2,038,125.06	0.1%
PCCP	10	$66,627,133.37	2.0%
PMEP	18	$9,576,909.55	0.3%
PMPT	16	$6,489,357.73	0.2%
PMRP	63	$12,462,802.00	0.4%
PMTH	92	$56,138,117.88	1.7%
SGNL	45	$65,514,843.69	2.0%
SIGN	11	$10,941,675.56	0.3%
BR	1	$1,801,628.63	0.1%
Total	1670	$3,294,633,084.63	

Table 4. Date Distribution by Work Type

Details of the cost categories applied to work types BRDG, GNRL, and HMAS are shown in *Table 5. Cost Coding for Work Types BRDG, GNRL, and HMAS*.

Code Used for Work Type BRDG, GNRL, HMAS	Description
< 500K	Contract amount less than $500,000
bet 500K & 1M	Contract amount equal to or greater than $500,000 but less than $1,000,000
bet 1M & 5M	Contract amount equal to or greater than $1,000,000 but less than $5,000,000
bet 5M & 10M	Contract amount equal to or greater than $5,000,000 but less than $10,000,000
>=10M	Contract amount equal to or greater than $10,000,000

Table 5. Cost Coding for Work Types BRDG, GNRL, and HMAS

A comparison of the frequency of occurrence in a poor status, identified in each table as "On Average - % of Project in Poor Status" , was made to the contract bid

amount, the average number of contract bid days, the number of days the contract overran the original completion, the number of days the contract overran the adjusted completion, and the average by contract type when work began. These comparisons are included in Table 6 through Table 10. The number of contracts is included in all tables to understand the magnitude of the result. The Work Type category "Overall" includes all work types, not just those presented.

Work Type	Number of Contracts in Category		On Average - % of Project in Poor Status	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	823	847	8.9%	19%
BRDG	27	51	2.8%	17%
BRDG < 500K	8	4	3.9%	19%
BRDG bet 500K & 1M	9	13	4.1%	15%
BRDG bet 1M & 5M	9	17	0.9%	22%
BRDG bet 5M & 10M	1	3	0.0%	18%
BRDG >=10M	NA	14	NA	11%
GNRL	83	124	10.2%	24%
GNRL < 500K	51	43	9.5%	27%
GNRL bet 500K & 1M	18	20	10.6%	27%
GNRL bet 1M & 5M	12	34	13.3%	23%
GNRL bet 5M & 10M	2	11	4.2%	13%
GNRL >=10M	NA	16	NA	21%
HMAS	403	392	8.6%	19%
HMAS < 500K	163	55	7.4%	19%
HMAS bet 500K & 1M	84	82	8.9%	21%
HMAS bet 1M & 5M	140	213	9.7%	19%
HMAS bet 5M & 10M	14	25	9.0%	17%
HMAS >=10M	2	17	15.0%	10%

Table 6. Percent of Project in Poor Status vs Cost Category

In *Table 6. Percent of Project in Poor Status vs Cost Category*, with the exception of the HMAS >=10M cost category, contracts where the completion date was adjusted appeared in a poor status more frequently than those whose completion date

was not adjusted. In the BRDG category, the percentage is highest for those bridge projects falling in the "bet 1M and 5M" category. For GNRL contracts, the highest occurrence in a poor status is for contracts less than one million. For hot mix asphalt, the highest occurrence is in the "bet 500K & 1M" category.

Table 7 is a comparison of the project bid days to poor status. Overall, adjustments to contract time occur more frequently for projects with higher bid days. This changes as work types are broken into smaller sample sizes. Bridge contracts equal to or greater than $10 million in contract cost have a heavy influence on the overall category for bridges and the Overall category. Mostly, contracts with a shorter contract time at bid perform poorer in this work type.

Work Type	Number of Contracts in Category		On Average - % of Project in Poor Status		Average # of Bid Days	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	823	847	8.9%	19%	186.5	242.8
BRDG	27	51	2.8%	17%	224.0	411.7
BRDG < 500K	8	4	3.9%	19%	154.5	77.8
BRDG bet 500K & 1M	9	13	4.1%	15%	182.6	132.8
BRDG bet 1M & 5M	9	17	0.9%	22%	292.1	315.5
BRDG bet 5M & 10M	1	3	0.0%	18%	540.0	496.3
BRDG >=10M	NA	14	NA	11%	NA	864.9
GNRL	83	124	10.2%	24%	213.9	313.8
GNRL < 500K	51	43	9.5%	27%	157.5	149.1
GNRL bet 500K & 1M	18	20	10.6%	27%	284.3	179.4
GNRL bet 1M & 5M	12	34	13.3%	23%	261.9	301.7
GNRL bet 5M & 10M	2	11	4.2%	13%	731.5	609.9
GNRL >=10M	NA	16	NA	21%	NA	746.6
HMAS	403	392	8.6%	19%	188.6	227.4
HMAS < 500K	163	55	7.4%	19%	138.1	146.5
HMAS bet 500K & 1M	84	82	8.9%	21%	169.2	173.8
HMAS bet 1M & 5M	140	213	9.7%	19%	234.1	226.7
HMAS bet 5M & 10M	14	25	9.0%	17%	363.7	324.6
HMAS >=10M	2	17	15.0%	10%	716.0	612.6

Table 7. Percent of Project in Poor Status vs Bid Days

This is similar to the GNRL work type with the exception of contracts in the "GNRL bet 1M & 5M category" where projects with longer contract time at bid appear to be in a poor status more frequently. There is not a strong agreement of poor status vs longer contract time for those projects in the HMAS work type.

Table 8 and Table 9 compare poor status to days overrun of original completion and adjusted completion. There is not a strong correlation with the number of days exceeding either the original or the adjusted completion and the project bid amount with poor status.

Work Type	Number of Contracts in Category		On Average - % of Project in Poor Status		On Average - # Days Project Overran Original Compl	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	823	847	8.9%	19%	-19.8	131.7
BRDG	27	51	2.8%	17%	-22.8	143.2
BRDG < 500K	8	4	3.9%	19%	-36.4	62.8
BRDG bet 500K & 1M	9	13	4.1%	15%	-18.1	63.2
BRDG bet 1M & 5M	9	17	0.9%	22%	-6.4	161.9
BRDG bet 5M & 10M	1	3	0.0%	18%	-103.0	77.0
BRDG >=10M	NA	14	NA	11%	NA	231.9
GNRL	83	124	10.2%	24%	-30.8	170.3
GNRL < 500K	51	43	9.5%	27%	-31.0	101.3
GNRL bet 500K & 1M	18	20	10.6%	27%	-43.6	162.5
GNRL bet 1M & 5M	12	34	13.3%	23%	-5.9	172.3
GNRL bet 5M & 10M	2	11	4.2%	13%	-59.5	203.9
GNRL >=10M	NA	16	NA	21%	NA	337.8
HMAS	403	392	8.6%	19%	-14.2	124.3
HMAS < 500K	163	55	7.4%	19%	-14.3	70.0
HMAS bet 500K & 1M	84	82	8.9%	21%	-15.0	92.3
HMAS bet 1M & 5M	140	213	9.7%	19%	-14.6	139.5
HMAS bet 5M & 10M	14	25	9.0%	17%	-11.0	136.4
HMAS >=10M	2	17	15.0%	10%	27.0	245.5

Table 8. Percent of Project in Poor Status vs Days Project Overran Original Completion

Work Type	Number of Contracts in Category		On Average - % of Project in Poor Status		On Average - # Days Project Overran Adj Compl	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	823	847	8.9%	19%	-19.7	0.0
BRDG	27	51	2.8%	17%	-22.8	3.8
BRDG < 500K	8	4	3.9%	19%	-36.4	-1.8
BRDG bet 500K & 1M	9	13	4.1%	15%	-18.1	1.8
BRDG bet 1M & 5M	9	17	0.9%	22%	-6.4	-5.1
BRDG bet 5M & 10M	1	3	0.0%	18%	-103.0	-0.3
BRDG >=10M	NA	14	NA	11%	NA	19.1
GNRL	83	124	10.2%	24%	-30.8	-8.4
GNRL < 500K	51	43	9.5%	27%	-31.0	-3.3
GNRL bet 500K & 1M	18	20	10.6%	27%	-43.6	-33.3
GNRL bet 1M & 5M	12	34	13.3%	23%	-5.9	-16.1
GNRL bet 5M & 10M	2	11	4.2%	13%	-59.5	-3.7
GNRL >=10M	NA	16	NA	21%	NA	22.0
HMAS	403	392	8.6%	19%	-14.1	-1.0
HMAS < 500K	163	55	7.4%	19%	-14.3	-6.5
HMAS bet 500K & 1M	84	82	8.9%	21%	-15.0	-7.6
HMAS bet 1M & 5M	140	213	9.7%	19%	-14.4	2.0
HMAS bet 5M & 10M	14	25	9.0%	17%	-11.0	0.6
HMAS >=10M	2	17	15.0%	10%	27.0	9.2

Table 9. Percent of Project in Poor Status vs Days Project Overran Adjusted Completion

In evaluating the time in the contract when work actually began, 222 projects had no estimate generated as of the reporting period of this data. Since no work was complete, removing these projects from the original 1670 contracts resulted in Table 10. In BRDG work type category including all bridge cost categories, there is a strong relationship between poor status and when work began for projects where the contract completion was adjusted. While it is intuitive that a late start results in a late finish, contractors could complete large volumes of construction work in a short period. Hot mix asphalt is one example, given good weather. Bridgework is unlike asphalt paving or general type

work. While not heavily dependent on weather, there are conditions such as strength of material that influence bridgework.

Work Type	Number of Contracts in Category		Average of % of Project in Poor Status		Average of % in contract where work began	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	673	788	10%	20%	36%	37%
BRDG	25	49	3%	17%	16%	34%
BRDG < 500K	7	3	4%	26%	21%	74%
BRDG bet 500K & 1M	8	12	5%	17%	10%	45%
BRDG bet 1M & 5M	9	17	1%	22%	20%	34%
BRDG bet 5M & 10M	1	3	0%	18%	2%	38%
BRDG >=10M	NA	14	NA	11%	NA	15%
GNRL	67	121	11%	24%	27%	30%
GNRL < 500K	38	40	10%	28%	29%	41%
GNRL bet 500K & 1M	15	20	11%	27%	22%	22%
GNRL bet 1M & 5M	12	34	13%	23%	26%	27%
GNRL bet 5M & 10M	2	11	4%	13%	26%	27%
GNRL >=10M	NA	16	NA	21%	NA	20%
HMAS	336	373	10%	20%	35%	37%
HMAS < 500K	114	49	9%	21%	42%	55%
HMAS bet 500K & 1M	72	76	10%	22%	33%	41%
HMAS bet 1M & 5M	134	206	10%	20%	33%	37%
HMAS bet 5M & 10M	14	25	9%	17%	19%	18%
HMAS >=10M	2	17	15%	10%	6%	10%

Table 10. Percent of Project in Poor Status vs Percent in Time Work Began

The final analysis evaluates the timing of poor status. *Table 11. Consecutive Periods of Poor Status*, shows that projects appearing in a poor status within close reporting periods tend to have a higher frequency of poor status overall. This saturation is useful information since current reporting does not formally consider past status performance.

Work Type	Number of Contracts		Average of % of Project in Poor Status for All Entries	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	823	847	9%	19%
Consecutive	67	248	40%	39%
BRDG	1	15	20%	37%
GNRL	7	45	47%	40%
HMAS	31	117	41%	38%
Not Consecutive	756	599	6%	11%
BRDG	26	36	2%	8%
GNRL	76	79	7%	15%
HMAS	372	275	6%	11%

Table 11. Consecutive Periods of Poor Status

Additionally, *referring to Table 12. % Time Elapsed of First Poor Status*, contracts where the contract completion was not adjusted appeared on the status report, on average, sooner than those where the project completion was adjusted. This information may be useful in monitoring those contracts falling in a fair performance or Status 2.

Work Type	Number of Contracts		Average of % Time Elapsed of First Poor Status	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	**823**	847	**62%**	**69%**
BRDG	27	51	46%	63%
GNRL	83	124	58%	67%
HMAS	403	392	61%	66%

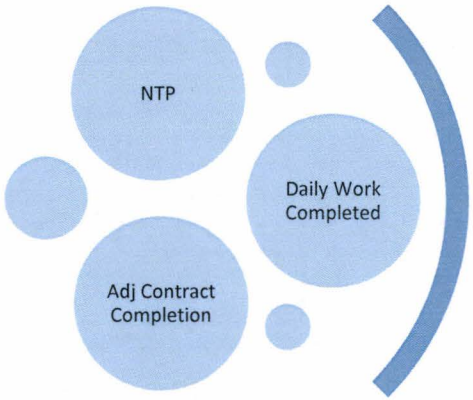
Table 12. % Time Elapsed of First Poor Status

Conclusions

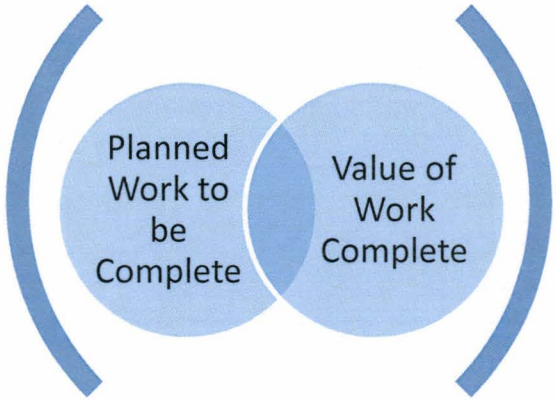
Evaluation of poor project performance data in the contract status report provides possible trend information for construction project managers to use when assessing project health. While the analysis did not support the development of a holistic tool for predicting timely project completion, there are indicators that could be helpful in identifying contracts whose timely project completion dates could be at risk. There are two recommendations from this research. The recurrence of a project in a poor status in consecutive periods produced the most meaningful results from the data. In addition to providing singular monthly contract status data to project managers, provide historical project trend data from prior month's contract status reports. The additional reporting may consist of charts as an attachment to the contract status report. The second recommendation is to perform a similar analysis of contract performance in a fair condition, Status 2. The research presented in this report focused on projects in a poor status, Status 3 or 4. Additional research could lead to a holistic tool for evaluating and identifying contracts at risk of completing late. At a minimum, it could provide indicators that prompt a higher level of attention to projects that have the *potential* to perform poorly.

References

1. A Guide to the Project Management Body of Knowledge (PMBOK Guide),(Project Management Institute, Inc., 2013)
2. South Carolina State Highway Department, Standard Specifications for Highway Construction(South Carolina State Highway Department, 1939)
3. Report Card (American Society of Civil Engineers, 2013) http://www.infrastructurereportcard.org/a/#p/grade-sheet/americas-infrastructure-investment-needs
4. Beyond the Short Term: Transportation Asset Management for Long-Term Sustainability, Accountability and Performance (Federal Highway Administration, 2015) https://www.fhwa.dot.gov/asset/10009/tam_topr806_2.cfm



SiteManager Input



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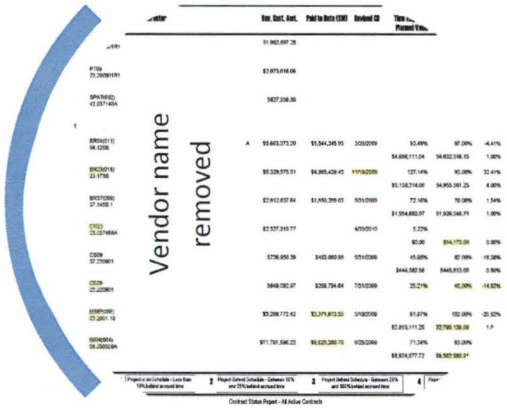

Contract Status Report

Appendix A – Contract Status Report Input

Attachment B – Example Contract Status Report

Example Report

Contract Status Report

The information contained in this report is obtained from the SiteManager dthe Primavera databases. Contracts are considered active and selected for this report when neither a "Substantial Work Complete Date" nor a Final Estimate have been submitted. Note to Districts: if any contract listed in this report is substantially complete, please determine the Substantial Work Complete Date and submit the information under "Form Submission" on the SCDOT Intranet website.

PRIMAVERA

Trns port SiteManager Construction Management Software

District	Contracts on Schedule			Contracts Behind						Total Contracts (active and pending)	No. of CPM Leve 1 Projects	No. of CPM Leve 2 Projects
	Contracts with no status	Ahead or within 10% accrued time SM/Primavera Status (1)	% of Contracts on Schedule	10% - 25% behind accrued time SM/Primavera Status (2)		25% to 100% behind accrued time SM/Primavera Status (3)		More than 100% behind accrued time SM/Primavera Status (4)			166	153
1	0	42	71.2%	6	10.2%	7	11.9%	4	6.8%	59	28	31
2	0	39	90.7%		0.0%		0.0%	4	9.3%	43	17	26
3	0	36	97.3%	1	2.7%		0.0%		0.0%	37	17	20
4	0	30	66.7%	5	11.1%	9	20.0%	1	2.2%	45	31	14
5	0	38	69.1%	1	1.8%	6	10.9%	10	18.2%	55	24	31
6	0	26	59.1%	5	11.4%	11	25.0%	2	4.5%	44	24	20
7	0	28	77.8%	3	8.3%	1	2.8%	4	11.1%	36	25	11
	0	239	74.9%	21	6.6%	34	10.7%	25	7.8%	319	52.0%	48.0%

Contracts are grouped within this report in one of four status groups...

Status 1 - Contracts on Schedule. These contracts are either ahead of schedule or are less than 10% behind the percentage of elapsed time on the contract.	Status 2 - Contracts Behind Schedule. These contracts are presently 10% to 25% behind schedule when compared with elapsed time on the contract.	Status 3 - Contracts Behind Schedule. These contracts are presently more than 25% behind schedule when compared with elapsed time on the contract.	Status 4 - Project Status to be Reviewed. These contracts are more than 100% behind schedule when compared with elapsed time on the contract. These contracts must be reviewed to determine if work is substantially complete or other problems exist.

Example Report

Example Report

District/Status	File Number / Contract No / Work Type	Rev. Cont. Amt. / CPM Level	Paid to Date (SM)	Revised CD	Time Elapsed / Planned Value	Perc Compl / Earned Value	PercBhnd / Behind Plan
1							
1							
	0042334	$812,294.11	$0.00	11/30/2014		0.00%	
	40.042334R1	2					
	GNRI						
	041043RD01R2	$219,799.00	$0.00	12/15/2014	-9.75%	0.00%	-9.75%
	3281010	1					
	LDSC						
	1014(004)	$1,354,908.01	$0.00	11/30/2014		0.00%	
	28.101404	1					
	HMAS						
	1014(010)	$643,082.66	$402,452.70	5/31/2014	55.47%	62.58%	-7.11%
	32.101401	2			163859.23	171662.05	-0.05
	HMAS						
	1014(010)	$1,032,604.08	$0.00	6/30/2014		0.00%	
	28.101401	2			0.00	0.00	0
	ASPT						
	1014(040)	$1,236,087.55	$0.00	10/31/2014		0.00%	
	43.101404	1					
	HMAS						
	1014(040)	$533,282.01	$0.00	10/31/2014		0.00%	
	40.101404	1					
	HMAS						
	3314(010)	$357,013.60	$0.00	6/30/2014	-4.60%	0.00%	-4.60%
	32.331401	1					
	PCCP						
	3314(020)	$245,826.75	$0.00	11/30/2014		0.00%	
	32.331402R1	1					
	HMAS						
	3413010	$1,855,725.00	$0.00	10/31/2015		0.00%	
	5180240	1					
	BRDG						

Vendor names removed

Status Legend . . . . 1 Project is on Schedule - Less than 10% behind accrued time | 2 Project Behind Schedule - Between 10% and 25% behind accrued time | 3 Project Behind Schedule - Between 25% and 100% behind accrued time | 4 Project Status needs to be verified - Over 100 % behind accrued time

Example Report

District Status	File Number / Contract No / Work Type	Rev. Cont. Amt / CPM Level	Paid to Date (SM)	Revised CD	Time Elapsed / Planned Value	Perc Compl / Earned Value	PercBind / Behind Plan
	6314010, 651401	$127,153.01	$0.00	7/31/2014		0.00%	
	31.631401R1	1					
	HMAS						
	6314010, 651401	$986,844.91	$0.00	8/31/2014		0.00%	
	40.651401R1	1					
	HMAS						
	BR32 (024)	$2,025,543.34	$1,475,239.12	8/7/2014	71.27%	72.83%	-1.56%
	32.037633A	2			1217871.20	1135836.95	0.07
	GNRL						
	BR40(004)	$25,017,850.75	$21,536,097.60	8/22/2014	91.08%	86.08%	5.00%
	40.249B.1	2			20276498.76	20449923.92	-0.01
	BRDG						
	BR88(042)	$34,100,094.18	$30,547,840.71	5/31/2014	95.59%	89.58%	6.01%
	09.123BR1	2			34232878.67	33175169.46	0.03
	BRDG						
	C-41306	$263,094.75	$0.00	6/30/2014		0.00%	
	3179840	1					
	GNRL						
	C-42797	$950,915.11	$680,158.09	7/31/2014	38.38%	71.53%	-33.14%
	40.042797	1					
	HMAS						
	C-42798	$398,554.39	$0.00	11/30/2014		0.00%	
	43.042798	1					
	HMAS						
	DT10003	$208,794.75	$0.00	5/31/2015		0.00%	
	32.039386R1	1					
	GNRL						
	EM05(001)	$4,870,805.73	$4,452,123.71	4/30/2014	94.31%	91.40%	2.90%
	32.255BR1	2			4646510.39	4560095.65	0.02
	GNRL						
	IM40(016)	$68,113,497.65	$56,276,183.28	8/15/2014	79.94%	82.62%	-2.68%
	40.260BR1	2			61212395.77	55884924.86	0.09
	GNRL						

Vendor names removed

Status Legend . . . . 1 Project is on Schedule - Less than 10% behind accrued time | 2 Project Behind Schedule - Between 10% and 25% behind accrued time | 3 Project Behind Schedule - Between 25% and 100% behind accrued time | 4 Project Status needs to be verified - Over 100 % behind accrued time

Example Report

Vendor names removed

District Status	File Number / Contract No / Work Type	Rev. Cont. Amt / CPM Level	Paid to Date (SM)	Revised CD	Time Elapsed / Planned Value	Perc Compl / Earned Value	PercBhnd / Behind Plan
	IM88(004)	$20,198,734.81	$13,860,584.32	7/31/2014	90.45%	68.62%	21.83%
	32.038831	2			17119204.03	16801987.72	0.02
	HMAS						
	MP08(010)	$535,132.30	$0.00	11/30/2014		0.00%	
	32.037375R1	2					
	GNRL						
	MR13(004)	$1,555,527.22	$1,367,051.72	5/16/2014	86.47%	87.88%	-1.41%
	40.041644	2			1485933.68	1485493.68	0
	HMAS						
	MR14(003)	$3,989,231.46	$0.00	5/31/2015	-11.81%	0.00%	-11.81%
	32.042587	1					
	HMAS						
	MR14(047)	$4,216,527.63	$1,444,739.28	9/30/2014	23.43%	34.26%	-10.83%
	28.042661	1					
	HMAS						
	MR14(050)	$5,756,128.91	$345,975.01	11/30/2014	14.08%	6.01%	8.07%
	40.042664	1					
	HMAS						
	MR14(085	$3,446,267.24	$0.00	9/30/2014	18.30%	0.00%	18.30%
	02.042699	1					
	HMAS						
	MR14(093)	$747,311.03	$0.00	10/31/2014		0.00%	
	28.042707	1					
	ASPT						
	MR14(095)	$713,349.04	$0.00	11/30/2014	-0.41%	0.00%	-0.41%
	32.042709	1					
	HMAS						
	MR14(139)	$59,653.20	$0.00	6/30/2014		0.00%	
	32.043004	1					
	HMAS						
	NGR1(006)	$322,195.00	$97,555.20	8/31/2014	35.44%	30.28%	5.16%
	4751.042515	1					
	GDRL						

Status Legend . . . . 1 Project is on Schedule - Less than 10% behind accrued time | 2 Project Behind Schedule - Between 10% and 25% behind accrued time | 3 Project Behind Schedule - Between 25% and 100% behind accrued time | 4 Project Status needs to be verified - Over 100 % behind accrued time

Example Report

District Status	File Number / Contract No / Work Type		Rev. Cont. Amt / CPM Level	Paid to Date (SM)	Revised CD	Time Elapsed / Planned Value	Perc Compl / Earned Value	PercBhnd / Behind Plan
	ORAN	Vendor names removed	$1,880,702.28	$1,086,335.20	8/20/2014	70.66%	57.76%	12.90%
	09.041454		2			1024814.43	1024814.43	0
	SGNL							
	P026858		$819,645.21	$0.00	9/30/2014		0.00%	
	2880890		1					
	HMAS							
	P026871		$2,349,827.77	$0.00	10/31/2014		0.00%	
	4380850		1					
	HMAS							
	P026886		$177,762.10	$0.00	8/31/2014		0.00%	
	5181020		1					
	PMRP							
	PM88(137)		$514,992.25	$230,322.90	6/30/2014	13.33%	44.72%	-31.39%
	4751.042550		2			35000.00	35000.00	0
	PMTH							
	PMD1(011)		$597,812.20	$486,161.12	6/30/2014	22.22%	81.32%	-59.10%
	4751.042197		2			107828.71	114568.00	-0.06
	PMTH							
	SA40(020)		$833,300.26	$18,344.00	7/31/2014	-0.83%	2.20%	-3.03%
	40.040619		2					
	GNRL							
	SA43(009)		$624,341.31	$110,123.30	7/31/2014	31.46%	17.64%	13.82%
	43.041125R1		2			97581.58	106858.93	-0.1
	GNRL							
	SRSP043		$65,681.00	$0.00	8/31/2014		0.00%	
	4081220		2					
	CGSW							
	SU32(001)		$10,748,909.69	$753,425.10	9/4/2015	-0.58%	7.01%	-7.59%
	32.273B		2					
	GNRL							
2								

Status Legend . . . . 1 Project is on Schedule - Less than 10% behind accrued time | 2 Project Behind Schedule - Between 10% and 25% behind accrued time | 3 Project Behind Schedule - Between 25% and 100% behind accrued time | 4 Project Status needs to be verified - Over 100 % behind accrued time

Example Report

District Status	File Number / Contract No / Work Type		Rev. Cont. Amt / CPM Level	Paid to Date (SM)	Revised CD	Time Elapsed / Planned Value	Perc Compl / Earned Value	PercBhnd / Behind Plan
	DT11(002)	Vendor names removed	$142,032.00	$22,323.45	5/31/2014	32.97%	15.72%	17.25%
	3240.040622R1		1					
	CGSW							
	IGR1(006)		$480,353.00	$74,111.14	8/31/2014	35.44%	15.43%	20.01%
	4751.042508		1					
	GDRL							
	IM28(004)		$12,939,895.22	$6,854,317.09	4/30/2015	51.35%	52.97%	-1.62%
	28.039535		2			7839268.18	6056732.46	0.23
	HMAS							
	IM88(020)		$75,750,000.00	$18,533,067.83	7/23/2015	32.54%	24.47%	8.07%
	0932.038170		2			18849207.06	16986986.09	0.1
	GNRL							
	SA40(021)		$989,412.67	$85,528.30	8/31/2014	25.37%	8.64%	16.72%
	40.041335		2					
	HMAS							
	SA88(036)		$729,628.45	$102,459.78	4/30/2014	34.78%	14.04%	20.74%
	4751.042317		1					
	PMTH							
3								
	SUMB(008)	Vendor names removed	$5,800,782.83	$942,814.17	7/31/2014	83.42%	16.25%	67.17%
	43.029713A		2					
	HMAS							
	1014(010)		$831,390.15	$337,070.33	5/31/2014	67.20%	40.54%	26.66%
	32.101402		2			392100.00	392100.00	0
	HMAS							
	BR43 (011)		$12,284,363.21	$2,457,828.83	11/30/2014	71.33%	20.01%	51.32%
	43.178B		2					
	BRDG							
	DT12(004)		$1,103,888.52	$342,191.49	5/31/2014	74.48%	31.00%	43.48%
	28.041817		2			955881.95	0.00	1
	HMAS							

Status Legend . . . . 1 Project is on Schedule - Less than 10% behind accrued time | 2 Project Behind Schedule - Between 10% and 25% behind accrued time | 3 Project Behind Schedule - Between 25% and 100% behind accrued time | 4 Project Status needs to be verified - Over 100 % behind accrued time

Example Report

Dist/Inst/Status	File Number / Contract No / Work Type		Rev. Cont. Amt / CPM Level	Paid to Date (SM)	Revised CD	Time Elapsed / Planned Value	Perc Compl / Earned Value	PercBhnd / Behind Plan
	IM32(026)	Vendor names removed	$1,720,329.78	$424,208.36	7/31/2014	35.11%	24.66%	10.45%
	32.040683		2			362956.58	0.00	1
	GNRL							
	pm88(136)		$286,601.16	$31,724.49	4/9/2014	96.85%	11.07%	85.78%
	3240.042271		1					
	PMTH							
	SA32(017)		$556,290.17	$34,239.20	5/31/2014	79.39%	6.15%	73.24%
	32.041178		2					
	HMAS							
4								
	MR13(094)	Vendor names removed	$418,628.30	$320,710.04	10/3/2013	305.75%	76.61%	229.14%
	31.041736		2			418628.30	418628.30	0
	GNRL							
	MR13(140)		$2,530,433.17	$1,964,760.38	10/3/2013	179.20%	77.65%	101.56%
	32.041878		2					
	HMAS							
	PMD1(010)		$816,859.60	$21,659.39	11/4/2013	574.19%	2.65%	571.54%
	4751.041386		2			507388.55	507388.55	0
	PMTH							

Status Legend . . . . 1 Project is on Schedule - Less than 10% behind accrued time | 2 Project Behind Schedule - Between 10% and 25% behind accrued time | 3 Project Behind Schedule - Between 25% and 100% behind accrued time | 4 Project Status needs to be verified - Over 100 % behind accrued time

Attachment C

Work Type	Name of Work Type
3000	Incorrect work type assignment
ASPH	Asphalt
ASPT	Asphalt Surface Treatment
BRDG	Bridge
BRPT	Bridge Painting
CGSW	Curb, gutter, sidewalk
DRST	Drainage Structure
GDRL	Guardrail
GNRL	General
HMAS	Hot mix asphalt
LDSC	Landscaping
PCCP	Portland cement concrete pavement
PMEP	Pavement marking epoxy
PMPT	Pavement marking paint
PMRP	Raised pavement markers
PMTH	Pavement marking thermoplastic
SGNL	Signal
SIGN	Signs
BR	

Appendix D

Work Type	Number of Contracts		On Average - % of Project in Poor Status		On Average - # Days Project Overran Original Compl		On Average - # Days Project Overran Adj Compl		Average # of Bid Days	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	823	847	8.9%	19%	-19.8	131.7	-19.7	0.0	186.5	242.8
3000	NA	1	NA	0%	NA	6.0	NA	0.0	NA	134.0
ASPH	NA	1	NA	8%	NA	540.0	NA	257.0	NA	167.0
ASPT	56	26	14.4%	12%	-6.0	96.3	-6.0	12.7	196.4	136.3
BR	NA	1	NA	7%	NA	7.0	NA	-68.0	NA	222.0
BRDG	27	51	2.8%	17%	-22.8	143.2	-22.8	3.8	224.0	411.7
BRDG < 500K	8	4	3.9%	19%	-36.4	62.8	-36.4	-1.8	154.5	77.8
BRDG bet 500K & 1M	9	13	4.1%	15%	-18.1	63.2	-18.1	1.8	182.6	132.8
BRDG bet 1M & 5M	9	17	0.9%	22%	-6.4	161.9	-6.4	-5.1	292.1	315.5
BRDG bet 5M & 10M	1	3	0.0%	18%	-103.0	77.0	-103.0	-0.3	540.0	496.3
BRDG >=10M	NA	14	NA	11%	NA	231.9	NA	19.1	NA	864.9
BRPT	5	3	0.0%	34%	-17.6	94.3	-17.6	3.7	139.6	141.7
CGSW	86	53	7.8%	16%	-31.7	82.4	-31.7	3.6	156.7	163.5
DRST	5	7	18.7%	22%	-60.4	97.0	-60.4	4.3	204.8	149.0
GDRL	17	63	5.8%	14%	-20.2	126.2	-20.2	-11.0	289.6	287.5
GNRL	83	124	10.2%	24%	-30.8	170.3	-30.8	-8.4	213.9	313.8
GNRL < 500K	51	43	9.5%	27%	-31.0	101.3	-31.0	-3.3	157.5	149.1
GNRL bet 500K & 1M	18	20	10.6%	27%	-43.6	162.5	-43.6	-33.3	284.3	179.4
GNRL bet 1M & 5M	12	34	13.3%	23%	-5.9	172.3	-5.9	-16.1	261.9	301.7
GNRL bet 5M & 10M	2	11	4.2%	13%	-59.5	203.9	-59.5	-3.7	731.5	609.9
GNRL >=10M	NA	16	NA	21%	NA	337.8	NA	22.0	NA	746.6
HMAS	403	392	8.6%	19%	-14.2	124.3	-14.1	-1.0	188.6	227.4
HMAS < 500K	163	55	7.4%	19%	-14.3	70.0	-14.3	-6.5	138.1	146.5
HMAS bet 500K & 1M	84	82	8.9%	21%	-15.0	92.3	-15.0	-7.6	169.2	173.8
HMAS bet 1M & 5M	140	213	9.7%	19%	-14.6	139.5	-14.4	2.0	234.1	226.7
HMAS bet 5M & 10M	14	25	9.0%	17%	-11.0	136.4	-11.0	0.6	363.7	324.6
HMAS >=10M	2	17	15.0%	10%	27.0	245.5	27.0	9.2	716.0	612.6
LDSC	3	8	0.0%	24%	-40.3	264.4	-40.3	-0.3	166.0	164.3
PCCP	7	3	5.4%	18%	-12.7	122.3	-12.7	-1.3	197.3	269.0
PMEP	11	7	8.6%	19%	-48.1	135.1	-48.1	15.9	171.5	137.3
PMPT	10	6	0.0%	15%	-76.7	142.5	-76.7	-3.5	159.3	110.5
PMRP	46	17	9.5%	22%	-17.5	85.2	-17.5	17.4	103.3	88.3
PMTH	44	48	11.2%	23%	-8.5	133.5	-8.5	17.6	143.4	146.5
SGNL	17	28	11.4%	25%	-35.5	186.5	-35.5	-2.5	302.2	324.1
SIGN	3	8	2.6%	21%	-89.3	91.8	-89.3	6.4	339.0	368.3

Work Type	# of Contracts		Average of % of Project in Poor Status		Average of adjusted % in contract where work began	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	673	788	10%	20%	36%	37%
3000	NA	1	NA	0%	NA	68%
ASPH	NA	1	NA	8%	NA	45%
ASPT	46	20	17%	15%	51%	42%
BR	NA	1	NA	7%	NA	0%
BRDG	25	49	3%	17%	16%	34%
BRDG < 500K	7	3	4%	26%	21%	74%
BRDG bet 500K & 1M	8	12	5%	17%	10%	45%
BRDG bet 1M & 5M	9	17	1%	22%	20%	34%
BRDG bet 5M & 10M	1	3	0%	18%	2%	38%
BRDG >=10M	NA	14	NA	11%	NA	15%
BRPT	5	3	0%	34%	14%	66%
CGSW	72	47	8%	18%	37%	42%
DRST	5	6	19%	24%	40%	52%
GDRL	15	56	7%	16%	18%	24%
GNRL	67	121	11%	24%	27%	30%
GNRL < 500K	38	40	10%	28%	29%	41%
GNRL bet 500K & 1M	15	20	11%	27%	22%	22%
GNRL bet 1M & 5M	12	34	13%	23%	26%	27%
GNRL bet 5M & 10M	2	11	4%	13%	26%	27%
GNRL >=10M	NA	16	NA	21%	NA	20%
HMAS	336	373	10%	20%	35%	37%
HMAS < 500K	114	49	9%	21%	42%	55%
HMAS bet 500K & 1M	72	76	10%	22%	33%	41%
HMAS bet 1M & 5M	134	206	10%	20%	33%	37%
HMAS bet 5M & 10M	14	25	9%	17%	19%	18%
HMAS >=10M	2	17	15%	10%	6%	10%
LDSC	1	6	0%	27%	31%	42%
PCCP	6	3	6%	18%	35%	5%
PMEP	5	6	19%	22%	31%	82%
PMPT	7	6	0%	15%	25%	78%
PMRP	31	15	13%	24%	53%	57%
PMTH	33	41	15%	25%	49%	52%
SGNL	16	26	12%	26%	32%	26%
SIGN	3	7	3%	24%	15%	54%

** Data used for Table 10

Work Type	# of Contracts		Average of % of Project in Poor Status for All Entries	
	Did not adjust completion	Project Completion Adjusted	Did not adjust completion	Project Completion Adjusted
Overall	823	847	9%	19%
Consecutive	67	248	40%	39%
ASPT	10	3	37%	24%
BRDG	1	15	20%	37%
BRDG < 500K	NA	NA	NA	NA
BRDG bet 500K & 1M	1	1	20%	50%
BRDG bet 1M & 5M	NA	7	NA	43%
BRDG bet 5M & 10M	NA	1	NA	53%
BRDG >=10M	NA	6	NA	24%
BRPT	NA	1	NA	54%
CGSW	4	9	32%	42%
CGSW <500K	3	5	32%	44%
CGSW bet 500K & 1M	1	4	30%	39%
DRST	1	1	50%	60%
GDRL	1	17	43%	36%
GNRL	7	45	47%	40%
GNRL < 500K	3	9	74%	46%
GNRL bet 500K & 1M	1	10	22%	38%
GNRL bet 1M & 5M	3	12	28%	44%
GNRL bet 5M & 10M	NA	5	NA	27%
GNRL >=10M	NA	9	NA	37%
HMAS	31	117	41%	38%
HMAS < 500K	10	6	43%	47%
HMAS bet 500K & 1M	7	21	44%	43%
HMAS bet 1M & 5M	11	73	38%	40%
HMAS bet 5M & 10M	2	10	52%	28%
HMAS >=10M	1	7	30%	20%
LDSC	NA	3	NA	43%
PCCP	NA	1	NA	17%
PMEP	2	1	35%	15%
PMPT	NA	1	NA	33%
PMRP	2	2	46%	63%
PMTH	6	16	36%	42%
SGNL	2	14	38%	39%
SIGN	NA	2	NA	36%
Not Consecutive	756	599	6%	11%
3000	NA	1	NA	0%
ASPH	NA	1	NA	8%
ASPT	46	23	9%	11%
BR	NA	1	NA	7%
BRDG	26	36	2%	8%
BRDG < 500K	8	4	4%	19%
BRDG bet 500K & 1M	8	12	2%	13%
BRDG bet 1M & 5M	9	10	1%	6%
BRDG bet 5M & 10M	1	2	0%	0%
BRDG >=10M	NA	8	NA	2%
BRPT	5	2	0%	24%
CGSW	82	44	7%	10%
CGSW <500K	77	43	7%	11%
CGSW bet 500K & 1M	5	1	7%	0%
DRST	4	6	11%	16%
GDRL	16	46	3%	7%
GNRL	76	79	7%	15%
GNRL < 500K	48	34	6%	22%
GNRL bet 500K & 1M	17	10	10%	16%
GNRL bet 1M & 5M	9	22	8%	11%
GNRL bet 5M & 10M	2	6	4%	0%
GNRL >=10M	NA	7	NA	1%
HMAS	372	275	6%	11%
HMAS < 500K	153	49	5%	16%
HMAS bet 500K & 1M	77	61	6%	13%
HMAS bet 1M & 5M	129	140	7%	8%
HMAS bet 5M & 10M	12	15	2%	9%
HMAS >=10M	1	10	0%	3%
LDSC	3	5	0%	13%
PCCP	7	2	5%	19%
PMEP	9	6	3%	19%
PMPT	10	5	0%	12%
PMRP	44	15	8%	16%
PMTH	38	32	7%	14%
SGNL	15	14	8%	11%
SIGN	3	6	3%	16%